A MONOGRAPHIC STUDY OF ILLINOIS SPECIES OF THE SAPROLEGNIALES AND LEPTOMITALES

BY

EVERETT SMITH BENEKE

A.B., Miami University, 1940
M.S., Ohio State University, 1941

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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A MONOGRAPHIC STUDY OF ILLINOIS SPECIES OF THE SAPROLEGNIALES AND LEPTOMITALES

This study of the water molds belonging to the orders Saprolegniales and Leptomitales occurring in Illinois represents the first extensive investigation of these orders in this area.

Collections for this study have been made over a period of 20 months and over 1400 samples have been examined for water molds. From a study of these and a survey of the literature, the presence in Illinois of a total of 53 species and 5 varieties belonging to 12 genera in the two orders can now be recorded. These are as follows: *Achlya ambisexualis* J. R. Raper, *Achlya americana* Humphrey, *Achlya bisexualis* Coker & A. Couch, *Achlya colorata* Pringsh., *Achlya conspicua* Coker, *Achlya contorta* Beneke, *Achlya flagellata* Coker, *Achlya imperfecta* Coker, *Achlya Klebsiana* Pieters, *Achlya Orion* Coker & Couch, *Achlya prolifera* (Nees) de Bary, *Achlya proliferoides* Coker, *Achlya racemosa* F. Hildebrand, *Achlya Rodrigueziana* F. T. Wolf, *Aphanomyces euteiches* Drechsler, *Aphanomyces laevis* de Bary, *Aphanomyces parasiticus* Coker, *Aphanomyces scaber* de Bary, *Aphanomyces stellatus* de Bary, *Aphanomyces* sp. ("non-fruiting"), *Brevilegnia diclina* J. Harv., *Brevilegnia megasperma* J. Harv., *Brevilegnia subclavata* Couch, *Brevilegnia unisperma* Coker & Braxton, *Brevilegnia unisperma* var. *delica* Coker & Alexander, *Brevilegnia unisperma* var. *litoralis* Coker & Braxton, *Brevilegnia unisperma* var. *montana* Coker & Braxton, *Calyptralegnia achlyoides* (Coker & Couch) Coker, *Dictyuchus achlyoides* Coker & Alexander, *Dictyuchus missouriensis* Couch, *Dictyuchus monosporus* Leitgeb, *Dictyuchus pseudoachlyoides* Beneke, *Dictyuchus pseudodictyon* Coker & Braxton, *Geolegnia inflata* Coker & Harv., *Isoachlya intermedia* (Coker & Harv.) Coker, *Isoachlya toruloides* Kauffman &

Coker, *Leptolegnia caudata* de Bary,*Leptolegnia subterranea* Coker & Harv., *Protoachlya hypogyna* Shanor & Conover, *Protoachlya paradoxa* (Coker) Coker, *Protoachlya* sp. ("non-fruiting"), *Saprolegnia asterophora* de Bary, *Saprolegnia delica* Coker, *Saprolegnia diclina* Humphrey, *Saprolegnia ferax* (Gruith.) Thuret, *Saprolegnia lapponica* Gäumann, *Saprolegnia litoralis* Coker, *Saprolegnia megasperma* Coker, *Saprolegnia mixta* de Bary, *Saprolegnia monoica* Pringsh., *Saprolegnia monoica* var. *glomerata* Tiesenh., *Saprolegnia parasitica* Coker, *Saprolegnia turfosa* (Minden) Gäumann, *Thraustotheca clavata* (de Bary) Humphrey, *Thraustotheca primoachlya* Coker & Couch, *Apodachlya brachynema* (F. Hildebrand) Pringsh., *Apodachlya pyrifera* Zopf, and *Apodachlya pyrifera* var. *macrosporangia* Tiesenhausen.

The more commonly isolated species in Illinois are: *Dictyuchus monosporus, Dictyuchus missouriensis, Saprolegnia ferax, Saprolegnia parasitica, Achlya americana,* and *Achlya flagellata.* A number of species, rarely isolated thus far, were found in this state. They are: *Saprolegnia asterophora, Achlya Orion,* and *Calyptralegnia achlyoides.* Two species, *Saprolegnia lapponica* and *Achlya Rodrigueziana,* are reported from the Illinois collections for the first time in North America.

Two isolates possessing the characteristics of *Saprolegnia turfosa* (*S. monoica* var. *turfosa* Minden) as described by Gäumann from the Lapland area have been found in Illinois, and the significance of these in an evaluation of the name *Aplanes turfosus* applied to North Carolina isolates is discussed.

Two new species belonging to the Saprolegniales have been discovered and described. The first of these, *Achlya contorta,* is characterized by having very irregular oogonia with one or more oospores usually present in the extended outgrowths, terminal oogonia, diclinous antheridia and antheridial branches frequently coiling around the oogonial hyphae and oogonia.

The second new species, *Dictyuchus pseudoachlyoides,* has spore behavior and sporangial development characteristics similar to those of *Dictyuchus achlyoides.* This species is distinctive in having oogonia on long stalks, antheridial branches developing androgynously from the oogonial stalk, some antheridial branches bearing sporangia or secondary oogonia, and gemmae developing intercalarily or immediately below the sporangium.

The number of species identified in these two orders from Illinois collections is exceeded only by the number of species reported from North Carolina where water molds have been collected and studied for more than 40 years by students of these groups.

Keys to facilitate identification and descriptions of the species found in Illinois are included.

VITA

The author was born in Greensboro, North Carolina, on July 6, 1918. He attended the McGuffey elementary schools and the McGuffey High School, Oxford, Ohio, graduating June, 1936. During the years of 1936-1940, he attended Miami University at Oxford, Ohio, and received the A.B. degree in June, 1940. During the years 1940-1941 he held a fellowship in Horticulture at Ohio State University, where he carried on graduate study in Horticulture with a minor in Botany, being awarded the M.S. degree in August, 1941. During the year 1941-1942 he continued graduate work in Botany at the University of Illinois while serving as Assistant in Biology in the General Division of the College of Liberal Arts and Sciences. In June, 1942, he entered military service with the Army of the United States, and was assigned medical administrative duties in the Air Corps until December, 1945. He returned to the University of Illinois in March, 1946 as a graduate student and Assistant in Botany. The author is a member of the Botanical Society of America, the Mycological Society of America, the American Association for the Advancement of Science, and Sigma Xi. He is author of: (with L. Shanor) Representatives of the Saprolegniales and Leptomitales in Illinois, Am. Jour. Bot. 34:609, 1947 (Abstract); The Monoblepharidaceae as represented in Illinois, Trans. Ill. Acad. Sci. (in press) 1948; and A new species of *Achlya* and of *Dictyuchus*, Jour. Elisha Mitch. Soc. (in press) 1948.

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